

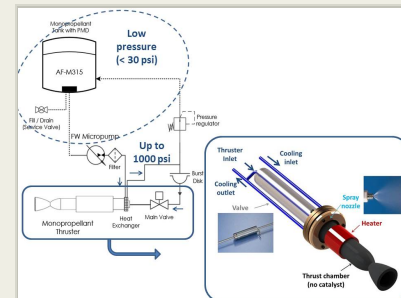
Low Cost, Pump-fed, Non-Catalytic Thruster for Secondary Payload Green Propulsion, Phase I

Completed Technology Project (2016 - 2016)



Project Introduction

Flight Works is proposing to expand its technology in micropump-fed propulsion, including 1U CubeSat green propulsion, to the development and demonstration of a low cost, pump-fed, cooled, non-catalytic 1-5 N-class AF-M315E thruster for secondary payload propulsion. Typically, requirements imposed by the primary mission have led secondary payloads to have very limited propulsion capability. For earth orbiting spacecraft, the requirements to reenter within 25 years can be an issue. For lunar or interplanetary missions, lack of significant ΔV capability limits the science potential. For example, the system in the Mars Cube One 6U spacecraft is only capable of a few tens of m/s. Many such nanosats, including CubeSats slated to accompany the primary spacecraft towards Europa, could greatly benefit from real delta-V capability (> 1 km/s) while reducing risks to the primary payload. Flight Works is proposing to develop such capability and focus on the development of a pump-fed AF-M315E thruster. In the novel concept, propellant atomization is improved, conventional materials can be used for the injector and the valve, resulting in a more compact, lower cost, high performance thruster. Also, since the approach to ignition and combustion sustainment does not involve catalysts, the thruster life-limiting component is removed. This thruster is integrated into a micropump-fed system: there is no need for a separate pressurization, the propellant storage and feed system operates at low pressures, and lighter, conformal tanks can be used. This combination decreases system overall size and mass by 20-40% depending on the mission while reducing risks to the primary payload. More generally, the technology is applicable to any propulsion system, whether primary or for attitude control, where hydrazine is currently used, and is competitive with bipropellant systems for microsats due to the reduced system mass.



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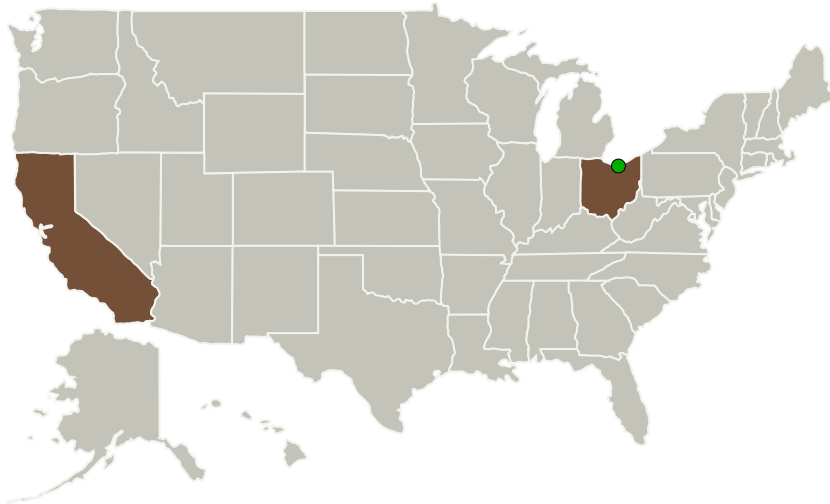
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Flight Works, Inc.	Lead Organization	Industry	Irvine, California
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations

California	Ohio
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Project Transitions



June 2016: Project Start



December 2016: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139618>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Flight Works, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

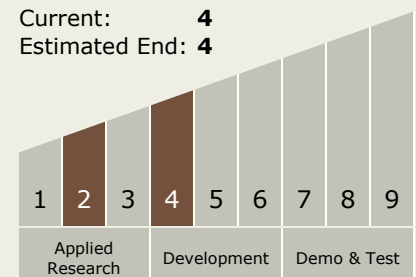
Carlos Torrez

Principal Investigator:

Nadim R Eid

Technology Maturity (TRL)

Start: 2
Current: 4
Estimated End: 4

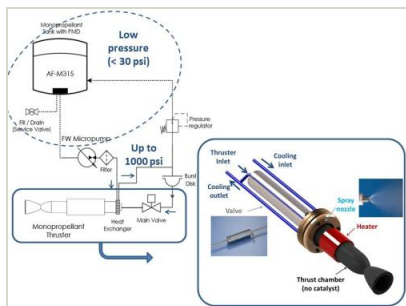


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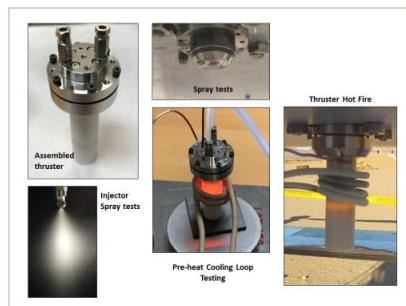


Images



Briefing Chart Image

Low Cost, Pump-fed, Non-Catalytic Thruster for Secondary Payload Green Propulsion, Phase I
(<https://techport.nasa.gov/image/133257>)



Final Summary Chart Image

Low Cost, Pump-fed, Non-Catalytic Thruster for Secondary Payload Green Propulsion, Phase I Project Image
(<https://techport.nasa.gov/image/137227>)

Technology Areas

Primary:

- TX01 Propulsion Systems
 - └ TX01.1 Chemical Space Propulsion
 - └ TX01.1.2 Earth Storable

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System